VARIABILITY OF TEMPERATURE AND RAINFALL IN BERLIN.

By O. MEISSNER.

[Reprinted from *Science Abstracts*, April, 1919, p. 151.]

A statistical investigation of serial monthly values of temperature and rainfall for Berlin gives the following results: (*a*) The variability of temperature and rainfall of the official Berlin observations, which have been made since 1848 in accordance with approved practice, is normal. (*b*) The amplitudes of the Brückner period and the sun-spot period in this series of observations are so small in comparison with the irregular variations of shorter period, that they require other methods for their determination. (*c*) The old Berlin observations of temperature made by Kirch from 1730 to 1750, when tested by statistical methods, show no reason why they should be regarded as nonhomogeneous. (*d*) The Brückner period of 34 years is well indicated in the temperature observations for August, from 1730 to 1750; in winter the periodicity is quite masked by chance variations.—*R. C[orless]*.

INVESTIGATION OF THE ATMOSPHERIC IN CLOUDY OR THICK WEATHER.

By H. LÖWY.

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The paper describes first of all, methods for obtaining observations of wind-velocity and direction in the upper air by various means which are effective in thick or cloudy weather. One method consists in noting the times of arrival of sounds produced by successive explosions at prearranged intervals at the positions which a free balloon, rising steadily, takes up at those intervals, and deducing therefrom the velocity and direction of the air layers through which it passes. Another is to observe the position at which a shell, fired at a known muzzle velocity and altitude, is seen to emerge from the clouds. Successive shells fired at gradually increasing velocities provide data for the exploration of the wind in successive heights. The computations for both of these methods become very laborious as the height increases, and even for low heights are much more complicated than the corresponding computations for the method of pilot balloons, which can, however, only be used in clear weather. Suggestions are also made for obtaining a record of temperature and pressure at different heights by means of projectiles.—*R. C.*

CHANGE OF ZERO OF THERMOMETERS.

It is well known that thermometers are liable to a "change of zero" with age. In the case of mercury thermometers, the readings become too high, while spirit thermometers read too low. The former effect is explained by a gradual shrinkage of the bulb which naturally forces the mercury up the stem and gives the thermometer a negative correction. For the behavior of spirit thermometers various reasons have been put forward; it has been thought that the thin film of liquid "wetting" the interior of the bore was sufficient to account for the errors found in tests and that standing the thermometer bulb downward for a long while would always get rid of the discrepancies as it certainly does in some cases. The vapor of the spirit has been supposed to enter into chemical combination with the glass or to make its way through it by way of invisible cracks. It seems likely, however, that there is a simpler explanation. As is described in textbooks of physics, mercury thermometers are sealed off when almost filled with mercury, so that they contain practically no air, and as the pressure inside the bulb is less than that outside the strain tends to make it shrink. On the other hand, spirit thermometers are sealed with the bulbs in a freezing mixture, so that they may contain as much air as possible, a condition which is said to reduce the trouble due to evaporation. The result is that such thermometers have high pressure inside the bulbs compared with outside, and therefore there must be a tendency for the bulbs to expand, so that the readings become too low and positive corrections are required.—*F. J. W. W.—Metcorological Office, Circ.* **41**, *Nov. 1, 1919, pp. 3–4.*

NOCTURNAL COOLING OF THE LOWER LAYERS OF THE ATMOSPHERE.

By H. PERROTIN.

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According to the equation commonly given in textbooks of meteorology, the temperature θ during the night obeys the law $\theta = \theta_0 + Ae^{-\sigma/c.t.}$, where it is supposed that temperature changes are due to radiation only. Here θ_0 is a fixed base temperature, A a constant, σ the so-called coefficient of radiation, c the specific heat of air at constant pressure, and t represents time. On applying this equation to observations made in different parts of the globe, a constant value of σ has been found (about 0.036), which is appreciably higher than the value of the coefficient as determined in the laboratory. According to observations made at Parc St. Maur, Paris, and at three levels (heights 123, 197, and 302 m.) on the Eiffel Tower, from 1890 to 1894, the coefficient varies from 0.033 at the surface to 0.022, 0.018, and 0.016 at the higher levels. It is concluded that the cooling of the lower layers is probably not produced like that of a solid placed in a uniform-temperature inclosure.—*R. C.*

ON THE COOLING OF AIR NEAR THE GROUND AT NIGHT.[1]

By G. HELLMANN.

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From observations of 10 minimum thermometers, which were arranged at every 5 cm. interval of height above the ground from 5 to 50 cm., the variation of minimum temperature with height is investigated. On clear nights a regular increase of temperature with height is shown, which follows an exponential law. On the average the difference of temperature from the ground to 50 cm. height is 3.7° C. An increase of cloudiness by 1° of the usual scale (0 = clear, 10 = overcast) diminishes this difference by a full third of a degree centigrade. An overcast sky gives no difference of temperature; rainy and windy weather gives a diminution of temperature of a few tenths of a degree.—*R. C.*

[1] Preuss. Akad. Wiss., Berlin, 1918, 38: 806–813.